

CLAIMS

What is claimed is:

1. A golf ball comprising:
  - a ball material;
  - a first tag which is attached to said ball material, said first tag having a first antenna which is coupled to a first diode, said first antenna being patterned as a first radial transmission line;
  - a second tag which is attached to said ball material, said second tag having a second antenna which is coupled to a second diode, said second antenna being patterned as a second radial transmission line, which is arranged substantially orthogonally relative to said first radial transmission line.
2. A golf ball as in claim 1 wherein said first tag and said second tag are substantially independent electrically and provide a substantially spherical reception pattern.
3. A golf ball as in claim 1 further comprising:
  - a layer material which encases said first tag and said second tag and said ball material.

4. A golf ball as in claim 1 wherein a width of said first and second antennas varies either substantially linearly or substantially exponentially with a length of said first and second antennas.
5. A golf ball as in claim 1 wherein said ball material is either a core material which has a substantially solid spherical shape or an inner shell which has a circular cross-sectional shape.
6. A golf ball as in claim 1 wherein said first diode is disposed at least partially in a first void in said ball material, and said second diode is disposed at least partially in a second void in said ball material.
7. A golf ball as in claim 1 wherein said ball material has a first template for forming said first antenna and a second template for forming said second antenna.
8. A golf ball as in claim 1 wherein each of said first and said second antennas has at least one perforation.
9. A golf ball as in claim 1 wherein each of said first and said second antennas is disposed between curved surfaces in said golf ball and wherein each of said first and said second antennas is designed to receive a radiofrequency (RF) signal of a first frequency and to re-radiate a return RF signal of a second frequency.

10. A golf ball as in claim 9 wherein said second frequency is a multiple of said first frequency.
11. A golf ball as in claim 1 wherein each of said first and said second antennas is disposed between curved surfaces in said golf ball and wherein said tag is detectable with a handheld transmitting/receiving device over a range of at least 20 feet separating said handheld transmitting/receiving device and said tag, and wherein said golf ball has high durability and substantially complies with golf ball specifications of the United States Golf Association.
12. A golf ball as in claim 1 wherein each of said first and said second antennas comprises a seed layer and a plated layer which is coupled to said seed layer.
13. A golf ball as in claim 1 wherein said first diode is coupled to said first antenna through a first pair of compressible conductors and wherein said second diode is coupled to said second antenna through a second pair of compressible conductors.
14. A golf ball as in claim 1 wherein said first antenna comprises a first inductive element and said second antenna comprises a second inductive element.
15. A golf ball as in claim 1 wherein said golf ball has at least two portions which include a core and a shell.

16. A golf ball as in claim 1 wherein an impedance of said first diode is substantially tuned to an impedance of said first antenna at both excitation frequency and re-radiated harmonic frequency.
17. A golf ball comprising:
  - a ball material;
  - a tag having a diode coupled to an antenna, said antenna having two radial transmission lines with a natural resonant frequency between an excitation frequency from a transmitting/receiving device which is designed to find said golf ball and a second harmonic of the excitation frequency.
18. A golf ball as in claim 17 wherein an impedance of said antenna is substantially tuned to an impedance of said diode at both excitation frequency and re-radiated harmonic frequency.
19. A golf ball as in claim 17 wherein a layer material encases said tag and said ball material.
20. A golf ball as in claim 17 wherein a tolerance parameter of said diode is enlarged relative to any diode which is used with a non-radial transmission line antenna.

21. A golf ball as in claim 20 wherein said tolerance parameter is a range of diode capacitances.
22. A golf ball as in claim 17 wherein a width of said antenna varies either substantially linearly or substantially exponentially with a length of said antenna.
23. A golf ball as in claim 17 wherein said ball material is either a core material which has a substantially solid spherical shape or an inner shell which has a circular cross-sectional shape.
24. A golf ball as in claim 17 wherein said diode is disposed at least partially in a first void in said ball material.
25. A golf ball as in claim 17 wherein said ball material has a template for forming said antenna.
26. A golf ball as in claim 17 wherein said antenna has at least one perforation.
27. A golf ball as in claim 17 wherein said antenna is disposed between curved surfaces in said golf ball and wherein said antenna is designed to receive a radiofrequency (RF) signal of a first frequency and to re-radiate a return RF signal of a second frequency.

28. A golf ball as in claim 27 wherein said second frequency is a multiple of said first frequency.
29. A golf ball as in claim 17 wherein said antenna is disposed between curved surfaces in said golf ball and wherein said tag is detectable with a handheld transmitting/receiving device over a range of at least 20 feet separating said handheld transmitting/receiving device and said tag, and wherein said golf ball has high durability and substantially complies with golf ball specifications of the United States Golf Association.
30. A golf ball as in claim 17 wherein said antenna comprises a seed layer and a plated layer which is coupled to said seed layer.
31. A golf ball as in claim 17 wherein said diode is coupled to said antenna through a first pair of compressible conductors.
32. A golf ball as in claim 17 wherein said antenna comprises a first inductive element.
33. A golf ball as in claim 17 wherein said golf ball has at least two portions which include a core and a shell.
34. A method of finding a findable golf ball having a tag, said method comprising:

positioning a transmitting/receiving device in a first orientation, said transmitting/receiving (T/R) device transmitting radiofrequency signals and receiving radiofrequency (RF) signals in said first orientation; changing said T/R device to a second orientation which is at a non-zero angle relative to said first orientation, said T/R device transmitting and receiving RF signals in said second orientation.

35. A method as in claim 34 wherein said changing is performed if no signal or a weak signal from a tag is received when said T/R device is in said first orientation.

36. A method as in claim 34 wherein said non-zero angle is an angle between about 45 degrees to about 135 degrees.

37. A method as in claim 34 wherein said findable golf ball has at least said tag and a further tag and wherein said changing is performed if one of said tag and said further tag fails.

38. A golf ball comprising:  
a ball material;  
a first tag which is attached to said ball material, said first tag having a first antenna which is coupled to a first electrical component;  
a second tag which is attached to said ball material, said second tag having a second antenna which is coupled to a second electrical component,

wherein a main axis of said second antenna is substantially orthogonal to a main axis of said first antenna.

39. A golf ball as in claim 38 wherein said first antenna comprises a folded dipole and said second antenna comprises another folded dipole.
40. A golf ball as in claim 38 wherein said first electrical component is a first diode and said second electrical component is a second diode.
41. A golf ball as in claim 38 wherein said first tag and said second tag provide a substantially spherical reception.
42. A golf ball as in claim 40 wherein an impedance of said first diode is substantially tuned to an impedance of said first antenna at both excitation and re-radiation frequencies.
43. A golf ball as in claim 38 wherein said ball material is either a core material which has a substantially solid spherical shape or an inner shell which has a circular cross-sectional shape.
44. A golf ball as in claim 40 wherein said first diode is disposed at least partially in a first void in said ball material, and said second diode is disposed at least partially in a second void in said ball material.



45. A golf ball as in claim 38 wherein said ball material has a first template for forming said first antenna and a second template for forming said second antenna.
46. A golf ball as in claim 38 wherein each of said first and said second antennas has at least one perforation.
47. A golf ball as in claim 38 wherein each of said first and said second antennas is disposed between curved surfaces in said golf ball and wherein each of said first and said second antennas is designed to receive a radiofrequency (RF) signal of a first frequency and to re-radiate a return RF signal of a second frequency.
48. A golf ball as in claim 47 wherein said second frequency is a multiple of said first frequency.
49. A golf ball as in claim 38 wherein each of said first and said second antennas is disposed between curved surfaces in said golf ball and wherein said golf ball is detectable with a handheld transmitting/receiving device over a range of at least 20 feet separating said handheld transmitting/receiving device and said tag, and wherein said golf ball has high durability and substantially complies with golf ball specifications of the United States Golf Association.

50. A golf ball as in claim 38 wherein each of said first and said second antennas comprises a seed layer and a plated layer which is coupled to said seed layer.
51. A golf ball as in claim 40 wherein said first diode is coupled to said first antenna through a first pair of compressible conductors and wherein said second diode is coupled to said second antenna through a second pair of compressible conductors.
52. A golf ball as in claim 38 wherein said first antenna comprises a first inductive element and said second antenna comprises a second inductive element.
53. A method of designing a golf ball with a tag, the method comprising:  
determining electrical properties of at least one material of a golf ball;  
determining parameters of an electrical component of a tag based upon said  
electrical properties.